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English translation of the Article 19 amendment **10/594844**

International Application No: PCT/JP2005/000226

Our Ref: 04NPCT010US

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The International Bureau of WIPO  
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Switzerland

**Amendment of the claims under Article 19(1)(Rule 46)**

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Agent's File reference: 04NPCT010

Dear Sir/Madam:

The Applicant, who received the International Search Report relating to the above identified International Application transmitted on March 22, 2005, hereby files amendment under Article 19(1) as in the attached sheets.

We hereby would like to amend the claims 1, 11, 12 and also cancel the claims 5, 10. The claims 2, 3, 4, 6, 7, 8, 9 are retained unchanged.

Very truly yours,

Masanori FUJIMAKI  
Patent Attorney

Attachment:

(1) Amendment under Article 19(1) 1 sheet

## Claims

[Claim 1](amended)

A semiconductor device comprising:

a wiring board in which electrode pads are formed on the surface thereof;

a semiconductor element which is disposed on the wiring board and in which electrodes are formed on the surface thereof;

bumps for connecting said electrodes to said electrode pads, said bumps being formed from solder; and

an underfill resin filled between said wiring board and said semiconductor element to embed said bumps, wherein

said wiring board comprises a solder resist disposed on the surface of the side on which said electrode pads are formed; wherein

apertures for exposing said electrode pads are formed on the solder resist; and

the thickness of said solder resist in the area excluding the area directly above said electrode pads is equal to or greater than the thickness of said underfill resin disposed on said solder resist in said area between said wiring board and said semiconductor element.

[Claim 2]

The semiconductor device according to claim 1, wherein the thickness of said underfill resin disposed on said solder resist is 50  $\mu\text{m}$  or less.

[Claim 3]

The semiconductor device according to claim 1 or 2, wherein the volume of said bumps is less than the volume of said apertures.

[Claim 4]

The semiconductor device according to claim 3, wherein the thickness of said solder resist is 30  $\mu\text{m}$  or more.

[Claim 5] (deleted)

[Claim 6]

A method for manufacturing a semiconductor device having a wiring board in which electrode pads are formed on the surface thereof, and a semiconductor element in which electrodes are formed on the surface thereof, wherein said wiring board comprises a solder resist which is disposed on the surface of the side on which said electrode pads are formed, and which is provided with apertures for exposing said electrode pads, said method comprising the steps of:

forming bumps on at least one element selected from said electrode pads and said electrodes;

depositing a liquid resin material on at least a portion of the area in which said semiconductor element is to be mounted on said wiring board;

pressing said semiconductor element to said wiring board to connect said electrode pads, said bumps, and said electrodes to each other;

melting and then solidifying said bumps to join said electrodes to said electrode pads by way of said bumps; and

curing said resin material and forming an underfill resin so that said bumps become embedded between said wiring board and said semiconductor element, wherein

the distance between said wiring board and said semiconductor element is controlled during the melting of said

bumps in said joining step, and the thickness of said solder resist in the area excluding the area directly above said electrode pads is equal to or greater than the thickness of said underfill resin disposed on said solder resist in said area between said wiring board and said semiconductor element after said underfill resin has been formed.

[Claim 7]

The method for manufacturing a semiconductor device according to claim 6, wherein the volume of said bumps is less than the volume of said apertures in the step for forming said bumps.

[Claim 8]

The method for manufacturing a semiconductor device according to claim 7, wherein the thickness of said solder resist is 30  $\mu\text{m}$  or more.

[Claim 9]

The method for manufacturing a semiconductor device according to any of claims 6 to 8, wherein the distance between said wiring board and semiconductor element is controlled by controlling the relative position of said semiconductor element with respect to said wiring board in said joining step.

[Claim 10] (deleted)

[Claim 11]

The method for manufacturing a semiconductor device according to any of claims 6 to 9, wherein a resin material to which a chemical capable of removing an oxide film is added is used as said resin material.

[Claim 12]

The method for manufacturing a semiconductor device according to any of claims 6 to 9, and 11, further comprising a step of carrying out plasma treatment on at least one surface selected from the surface on the side on which said electrode pads are formed on said wiring board, and the surface on the side on which said electrodes are formed on said semiconductor element, between the forming of said bumps and the depositing of said resin material.